# Blunt Thoracic Trauma Producing Heart Laceration

## Case Report

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WHILE myocardial injury resulting from blunt trauma to the chest has been recognized with increasing frequency, it is unusual for a resulting cardiac laceration to be treated successfully. The short survival period for such patients usually precludes transportation to a hospital. The following case report describes a patient in whom cardiac laceration was unique in that there was time for transportation and institution of successful treatment.

### Case Report

A 57-year-old woman was admitted to the emergency room semi-conscious and complaining of severe chest pain. Approximately 30 minutes prior to admission, while driving home, her car struck a bridge and the impact threw her forcibly against the steering wheel.

Physical examination revealed a semiconscious, pale, somewhat cyanotic woman without recordable blood pressure. Pulse rate was questionably noted to be 90. The patient had multiple facial lacerations and considerable bruising of the anterior chest. There was flail motion of the entire anterior chest and breath sounds were distant over the left hemithorax. Chest x-ray revealed a left hemopneumothorax and multiple anterior rib fractures.

A cuffed endotracheal tube was placed and ventilation was maintained with an Ambu bag. Large bore polyethylene intravenous catheters were placed percutaneously into both femoral veins and Dextran was administered. Closed tube thoracotomy was carried out on the left side and 2,000 cc. of blood were removed. Simultaneously blood pressure which had risen to 70 systolic again fell and the patient appeared to have expired. Closed chest massage, plus infusion of two units of unmatched O negative blood resulted in remarkable improvement; however, a great deal of blood again flowed out of the chest tube. The blood pressure stabilized at 70 systolic for approximately 10 minutes and then again began to fall. The patient was moved to the operating room.

One hour after admission left thoracotomy was performed without anesthesia initially and later with oxygen-cyclo propane. On opening the left chest a great deal of blood made it appear that the left pulmonary artery was completely transected at its emergence from the pericardium. This was controlled digitally and transfusion was continued, however, instead of expected improvement, deterioration followed. It was then noted that the pericardium was becoming tense. And when it was opened the supposed pulmonary artery laceration was found to be a 2-cm. pericardial tear immediately over the pulmonary artery. Tamponade had been produced and bleeding was seen coming from the right side of the heart. With control of the bleeding by hand pressure, the sternum was transected and bilateral thoracotomy was carried out. The laceration was approximately 8 cm. in length, extending from the inferior vena cava, over the atrium and onto the superior vena cava (Fig. 1) and was controlled by a Satinsky clamp and sutured with OOO silk. Transfusion was continued, monitoring right atrial pressure until the systolic blood pressure was 110/60 with right atrial pressure 15 cm. water. Sodium bicarbonate—8.5 Gm., calcium gluconate—500 mg., and 21 units of blood were used. After hemostasis of the chest wall the chest was closed with bilateral pleural drainage. Laparotomy through a small upper midline incision was quickly carried out. No intra-abdominal injury was found; tube gastrostomy was done and the abdomen was closed. Tracheostomy with a cuffed tracheostomy tube was performed.

In the recovery room, the patient awakened and

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responded. Hourly urine output, venous pressure and arterial pressure were normal. She was kept on a Bird respirator for 13 days because of flail chest. On the fourth day, bronchoscopy was required to keep the tracheobronchial tree clear, and was repeated daily for 3 days. On the fifth day atrial fibrillation suddenly developed. After administration of digitalis normal sinus rhythm eventually returned. The postoperative course was otherwise uncomplicated and the patient was discharged 35 days after injury.

## Discussion

Bright and Beck [1] wrote on non-penetrating wounds of the heart in 1935 and collected 152 cases from the literature. They found that all four chambers were about equally involved, and that though all patients died 30 survived for at least an hour and had repairable lesions. Twenty-nine of these patients died of tamponade and one of exsanguination.

Parmley *et al.*,[4] reviewed 546 autopsy cases of non-penetrating injury to the heart amongst which rupture of the heart occurred in 353. The two ventricles were ruptured with equal frequency, the atria less commonly, but of these the right atrium was ruptured more frequently. Of 67 cases of atrial rupture only 13 survived long enough to have been treated. The majority died in less than an hour.

Pericardial rupture occurred in 71 of 161 instances of isolated atrial or ventricular rupture. Pericardial rupture is important in survival after myocardial laceration. Boyd [2] pointed out that with penetrating wounds, if both the pericardial and myocardial wounds are large, the patient rapidly exsanguinates; whereas, if the pericardial wound is small in relation to the myocardial wound, hemopericardium results with slowing down of bleeding and longer survival. With closed chest injury if the pericardium is not lacerated tamponade will occur. In the case here reported an 8-cm. right atrial wound with a 2-cm. pericardial wound controlled hemorrhage, yet did not produce tamponade.

Desforgis, Ridder and Lenoci [3] reported a similar survival in which the laceration involved the right atrium at the superior vena cava junction and the pericardial laceration overlaid the myocardial one. This patient was operated upon 9 hours after admission and recovered.

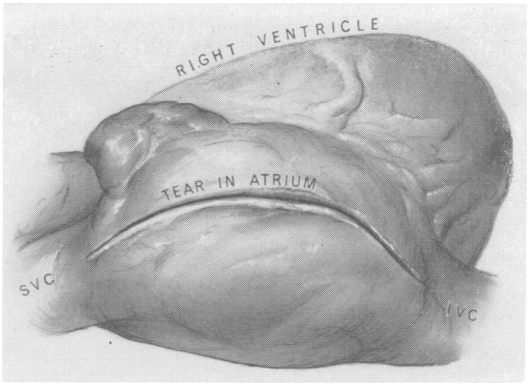


FIG. 1. Laceration extending from the inferior vena cava, over the atrium and onto the superior vena cava.

## Summary

A case of right atrial inferior-superior vena caval laceration complicating blunt injury to the chest is reported. Left hemothorax, flail chest and shock required resuscitative measures. Prompt thoracotomy and control of bleeding from the laceration was successful. The mechanism of the injury is probably a shearing of the atrium between the sternum, anteriorly, and the thoracic spine, posteriorly. Review of the literature reveals that in autopsy series this injury is not infrequent, and in occasional instances patients survive long enough for treatment to be instituted. An earlier similar case has been reported.

## References

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